

## *Developing Practical Cooperation through Science*

**Belarus has been actively engaged within the framework of the NATO Science for Peace and Security (SPS) Programme since 1992.**

The NATO SPS Programme enables close collaboration on issues of common interest to enhance the security of NATO and partner nations by facilitating international efforts to meet emerging security challenges, supporting NATO-led operations and missions, and advancing early warning and forecast for the prevention of disasters and crises.

The current SPS Key Priorities include:

- *Counter-Terrorism;*
- *Energy Security;*
- *Cyber Defence;*
- *Defence against CBRN Agents;*
- *Environmental Security;*
- *Security-related Advanced Technology;*
- *Border and Port Security;*
- *Human and Social Aspects of Security.*

Additionally, the SPS Programme helps to promote *regional security* through scientific cooperation among partners. The programme also helps to *prepare* interested eligible nations for NATO membership. SPS activities often have a high *public diplomacy* value.

# **BELARUS**

Belarus has completed several activities with the SPS Programme. The leading areas for cooperation have included **Security-related Advanced Technology, Defence Against CBRN, and Environmental Security**. Below are some examples of ongoing and completed projects under the framework of the NATO SPS Programme.

## *Cooperative Activities*

### **NANO-OPTICS: PRINCIPLES ENABLING BASIC RESEARCH AND APPLICATIONS**

Nano-optics has the promise of improving the state of the art in defence and security applications ranging from radar to chemical radiation. They are the key technologies of the 21<sup>st</sup> century with the potential to form an



important part of many future security-related technologies, for example, detection systems. During this Advanced Study Institute (ASI) held in July 2015, young scientists from NATO Allies and partner countries were trained to the principles and applications of nano-optics and nano technologies. The goal was to foster an interest amongst this group to subsequently pursue research in this area and to help translate the promising theory into practical application [ref. 984883].

In July 2013, an ASI entitled '**Nano-Structures for Optics and Photonics: Optical Strategies for Enhancing Sensing, Imaging, Communications and Energy Conversion**' [ref. 984482] also took place in Italy. The purpose of this course was to introduce students to the field of nano-structures by providing them with a comprehensive overview of experiments and theory. *Both activities were organised by scientists and experts from Belarus and the United States.*

## QUANTUM NANO-PHOTONICS

This Advanced Study Institute (ASI) which took place in July and August 2017, was followed the success of previous ASIs on technology. The goal of this event was to present a clear exposition of the principles of nano-photonics, the application of nano-technology to mould the flow of light and to control the interaction between light and matter, to young scientists from NATO and partner countries. This helped to enable the participants to pursue their research activities in this field and/or to facilitate the efforts to move from basic theory to applications, particularly those which are relevant to defense and security. The institute presented a balanced number of topics related to basic principles and applications [ref. G5187]. *This activity was led by experts and scientists from Belarus and the United States.*

## BIODETECTORS BASED ON ADVANCED MICROCHIPS

This multi-year project to develop bio-detectors for the detection of biological agents coupled protein microarrays and liquid phase, nano-crystal-encoded microchips in a flow cytometry set-up. A technique was used to detect the fluorescent signal emitted when biological molecules immobilised on the surface of the liquid-phase chip are engaged. The resulting detection kits are able to detect bacteria such as *Meningitis*, *Mycobacterium* and *Bacillus anthracis*. Scientists and experts taking part in the project developed advanced optical equipment suitable for use with double-band emitting nano-crystals, which have been transferred to the commercial end-users of the project. [ref. 983207]. *This activity, which concluded in 2013, was led by scientists and experts from Belarus, the Russian Federation, and France.*

## FUNDAMENTAL and APPLIED NANOELECTRO-MAGNETICS II: THZ CIRCUITS, MATERIAL, DEVICES

Nano Electro-Magnetics is a brand new field of study in the area of nanotechnology. As it is in the very early stages development, its potential for defence and security applications has yet to be fully explored. This Advanced Research Workshop, held in June 2018 in Minsk, Belarus focused on terahertz applications for Nano Electro-Magnetics and relied on a network of high-level scientists. The ultimate goal of this workshop was to create links between experts in this new discipline, and to establish the potential for Nano Electro-Magnetics in the field of defence and security [ref. G5409]. *This activity was led by scientists and experts from Belarus and Italy.*

## RADIOACTIVE CONTAMINATION IN THE POLESSIE STATE RADIATION-ECOLOGICAL RESERVE

This multi-year project which assessed the hazards of radioactive contamination, included the analysis of archival material on contamination levels and field measurements. The primary objective was to develop uniform methods for the sampling and measurement of a number of isotopes in soil and water, and the level of contamination within the Chernobyl exclusion zone and the Khoyniki District of the Reserve. The project teams used data from most recent soil samples to study the migration and transport of the contamination through the atmosphere and water. The Ministry of Emergency Situations and Ministry of Environmental Safety and Natural Resources of Belarus have been the major end-users of the results. [ref. 983057]. *This activity was led by scientists and experts from Belarus, Ukraine, and Norway.*



The NATO Science for Peace  
and Security Programme